of Northern India. The chief features of the air movement in the hot weather months of March, April, and May are: (1) A feeble motion during night time, increasing rapidly to about 2h. p.m., and, under favourable conditions, blowing almost with the force of a gale during the next two or three hours; (2) intense dryness and excessive temperature, in which the humidity occasionally falls as low as two or three per cent., and the shade thermometer ranges between 105° and 115°; (3) clouds of dust, which give a peculiar reddish glare to the sunlight. Mr. Eliot shows, from careful comparisons of hourly observations of the various elements, that the more important features of the hot winds are practically identical with the winds of the cold weather months, the difference of their characteristics being chiefly due to the altered climatic conditions of the period.

THE United States Naval Observatory stands in a reservation of seventy acres. The magnetic buildings are on a small knoll surrounded by a deep ravine, and the only disturbances to which the magnetic observations are subject arise from an electric railroad, trolley system, at a distance of 1375 feet from the instruments. The ravine appears to diminish the effect of the railroad, for neither the declination nor the horizontal force instrument shows evidence of disturbance, though the vertical force records are slightly affected. Appendix I. to Washington Observations, 1894, is devoted to the magnetic work at the Observatory during that year by Lieut. C. C. Marsh. All the records are tabulated in periods of 26·68 days, instead of the calendar months, the calendar followed being that drawn up by Prof. Frank Bigelow. This plan has been adopted with the view of further studying the relation between the sun and the earth's magnetism. Several plates accompany Lieut. Marsh's report; and among the subjects illustrated by them are the Observatory grounds and buildings, composite curves of declination and horizontal force, curves of diurnal variations of the magnetic elements, and curves of hourly and monthly disturbances of the declination.

THE atomic weight of magnesium has recently been redetermined with great care by Prof. Richards and Mr. Parker, of Harvard, and an account of their results appears in the current numbers of the *Proceedings of the American Academy of Sciences* and the *Zeitschrift für anorganische Chemie*. The previous determinations of the atomic weight of this element showed a remarkable inconsistency until the year 1884, when Marignac recorded the results of a large number of closely concordant experiments pointing to the number 24·37. The accuracy of this number has now been confirmed by Messrs. Richards and Parker. The method selected was the analysis of magnesium chloride. The salt was prepared, with great precautions, from the double magnesium and ammonium chloride by heating in a current of dry hydrogen chloride; it was then transferred to a weighing tube, without the possibility of contact with moisture, and the chlorine precipitated by silver nitrate, either gravimetrically or volumetrically. The results of four series of very concordant experiments give the number 24·362 as the atomic weight of magnesium when oxygen is taken as 16·00, or 24·179 if oxygen be taken as 15·88.

In the *Zeitschrift für Elektro-chemie* for October 5, Messrs. E. J. Constam and A. von Hansen describe the preparation of potassium percarbonate by the electrolysis of a solution of potassium carbonate. It may be assumed that the alkali carbonates, like the salts of other dibasic acids, dissociate in very concentrated solutions more or less completely into the ions $\overset{+}{M}$ and $\overset{-}{MHCO_3}$, the latter may, under favourable circumstances, combine, at the moment of their separation at the anode, to form a percarbonate. In order to test this view, the authors have electrolysed a strong solution of potassium carbonate. At ordinary temperatures oxygen is evolved at the anode, and potassium bicarbonate precipitated; as the temperature falls the evolution of oxygen slackens, and at − 10° ceases almost entirely, a bluish amorphous powder appearing in place of the potassium bicarbonate. The best results are obtained with a saturated solution of potassium carbonate at temperatures not higher than − 15°. The current density (from 1 to 300 ampères per square decimetre) appeared to have little effect on the yield. The bluish precipitate is rapidly decomposed by water at the ordinary temperature, and must, therefore, be rapidly filtered off, dried on porous porcelain, and finally over phosphorus pentoxide. It then forms a bluish white, amorphous, hygroscopic powder. It loses carbon dioxide and oxygen when heated; in ice cold water it dissolves without decomposition, but the solution evolves oxygen at the ordinary temperature. It liberates iodine from potassium iodide or hydriodic acid, oxidises lead sulphide to sulphate, decolourises indigo, reduces manganese and lead peroxides, and evolves oxygen when treated with silver oxide. Dilute solutions of caustic potash or of sulphuric acid decompose it with formation of hydrogen dioxide.

THE additions to the Zoological Society's Gardens during the past week include two Chacma Baboons (*Cynocephalus porcarius*, ♂ ♀) from South Africa, presented by Captain Baker; a Grand Galago (*Galago crassicaudata*)) from East Africa, presented by Mrs. Le Poer Richardson; a One-streaked Hawk (*Melierax monogrammicus*) from West Africa, presented by Mrs. Palmer; an Oyster-catcher (*Hæmatopus ostralegus*), European, presented by Miss Beatrix Martin; two Ortalan Buntings (*Emberiza hortulana*), British, presented by Mr. John Young; a Black-eared Marmoset (*Hapale penicillata*) from South-east Brazil, two Choughs (*Pyrrhocorax graculus*), British, deposited; two Black Swans (*Cygnus atratus*) from Australia, two Coscoroba Swans (*Cygnus coscoroba*) from Antarctic America, purchased.

OUR ASTRONOMICAL COLUMN.

MARS.—A Kiel telegram, dated November 11, gives us the following information. "Mars, Trivium Charontis double November 10. Flammarion."

Trivium Charontis is not a canal, but one of those "oases," as Lowell terms them. It forms the meeting point of no less than nine canals, namely: Orcus, Erebus, the twin Hades, Styx, Cambyses, Cerberus, Laestrygon and Tartarus. The observation above referred to is of importance in that Lowell seems never, as far as we know, seen them double. He defines them as being regular both in position and shape. When they form the point of intersection of single canals they appear as round spots, but in the case of double canals "they look like rectangles with the corners rounded off." The most striking case he noticed was the very oasis, Trivium Charontis, that is in question. Lowell found also that the oases "grew" as the canals appeared to grow, so that this observation of Flammarion may be of a special interest as regards the development of this, the largest Martian oasis.

EPHEMERIS FOR COMET PERRINE.—A postal card from Kiel, dated November 7, informs us of the elements and ephemeris of this comet for the ensuing week, computed by Prof. H. Kreutz from observations made on November 2, 4, and 6. These are as follows:—

T = 1897 February 6·819 Berlin Mean Time.

$$\left.\begin{aligned} \omega &= 164^\circ\ 58'\cdot8 \\ \Omega &= \ \ 85\ \ 10\cdot2 \\ i &= 146\ \ \ \ 5\cdot4 \end{aligned}\right\}\ 1896\cdot0.$$

$$\log q = 0\cdot06722$$

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Ephemeris for Berlin Midnight.

1896.	R.A. h. m.	Decl. ° ′	Log Δ.	Br.
Nov. 10	20 9·6	+19 3	0·206	1·0
14	20 5·0	16 12	·219	1·0
18	20 1·3	13 34	·233	1·0
22	19 58·2	11 9	·246	0·9
26	19 55·9	8 55	·259	0·9

Prof. Holden has also communicated elements calculated from observations made on November 2, 3, and 4. These are somewhat different from those given above, but the computed position for November 18 is not far from that given in the above ephemeris, being R.A. 20h. 1·8s., Decl. 13° 57′.

On the 10th the comet was nearly in a straight line, joining δ and γ Sagittæ, being about as far from γ as δ is, only on the opposite side. The motion in declination is in the direction of α Aquilæ, near which star the comet will be found on the 26th.

THE LEONIDS.—In a preceding number of NATURE (vol. liv. p. 623), Mr. Denning gave full information for those wishing to observe this star shower with the naked eye, but, curiously enough, he did not mention the great advantage photography would afford us in obtaining a very accurate determination of the radiant point. One can quite understand that, by placing a small camera on a telescope equatorially mounted, and employing a wide angle lens oriented towards the radiant point, a large space in the sky can be included on the plate sufficient to catch many of the streaks if they be at all numerous. The plates can be changed every thirty minutes or so. It was the intention of the writer of this note, some fourteen days ago, to adopt this principle, and he has already been able to get the necessary apparatus ready. The use of a wide angle lens necessitates that, if an equatorial be used, the camera must be placed at the extreme end (object-glass end) of the telescope, otherwise the opening in the shutters will cut off some of the field, and in consequence neutralise to some extent the value of the wide angle. This was found to be so; but, by the kindness of Mr. J. Norman Lockyer, a siderostat was placed at his disposal. The instrument not having yet been set up since its return from the eclipse expedition, it was erected temporarily in a good position open towards the eastward.

Captain Abney has very generously lent a Cooke's lens, invented by Mr. Dennis Taylor, giving a field of about 75° and of about five inches focal length, so that only now fine weather is required.

It may be mentioned that the current (November) number of *The Observatory* contains an interesting article by Dr. Johnstone Stoney on the "Leonids," in which he quotes an extract from a letter received from General Tennant, who advises practically the same method described above. The appendix to this article contains a reference to the literature on the subject of the Leonids, from which we make the following summary.

Prof. H. A. Newton, *Silliman's Journal*, 1864, vols. xxxvii. and xxxviii. pp. 377 and 53 respectively. Prof. Adams, *Comptes rendus*, March 25, 1867, p. 651, and *Monthly Notices R.A.S.*, April 1867, p. 247. Signor Schiaparelli, *Les Mondes*, December 1866, and beginning of 1867. English outline of Schiaparelli's work, by Prof. Newton, *Philosophical Magazine* for July 1867, p. 34. M. Le Verrier, *Comptes rendus*, January 21, 1867, p. 94. Dr. Johnstone Stoney, *Monthly Notices R.A.S.*, June 1867, p. 271, and *Philosophical Magazine*, September 1867, p. 188.

SUNSPOTS, COMETS, AND CLIMATE VARIATIONS.—A problem of considerable interest is suggested by the paper which Herrn Johannes Unterweger contributes to vol. lxiv. of the *Denkschriften der Math. Natur. Wissen. Classe der Kais. Akad. der Wiss.* of Vienna. The pamphlet, which has been printed separately, is entitled, "Ueber zwei Trigonometrische Reihen für Sonnenflecken, Kometen und Klimatschwankungen," and contains a preliminary statement of the investigation in question. The main result of the work is that there seems to be found a striking similarity between the variations of a certain function obtained from periodic comets near perihelion and the curves illustrating sunspot and climate variations. This function is obtained from a formula (see *Denkschriften Kais. Akad. Wien.*, vol. lix.) that he has previously published, which gives a relationship between the function and the inclinations and perihelion distances of well-observed periodic comets. The comets dealt with are divided into two groups, according as their perihelia lie to the north or south of the solar equator, and the mean of those which pass through their perihelia during each year is taken. The author then finds two trigonometrical series which represent the periods of both sunspot frequency and the variations of this cometary function, the former of which includes a secular variation of about 70 years, while the latter indicates a 35-year variation corresponding with that due to climate variations. In the curves shown, Herrn Unterweger indicates a variation in the minima as well as in the maxima in the case of the calculated frequency of sunspots, the former of which does not really occur as observation shows. The investigation is, however, full of interest, and perhaps the more detailed discussion which he promises will throw more light on this question.

THE EXPLOSIVE PROPERTIES OF ACETYLENE.

IN view of attempts to extend the use of acetylene as an illuminant, the disastrous explosion in Paris, to which reference was made in our issue of October 22, has created a good deal of anxiety in this country. In this connection it may interest our readers to have a further account of the memoir on the explosive properties of acetylene recently presented to the French Academy by MM. Berthelot and Vieille (see NATURE, vol. liv. p. 591).

The authors state that in acetylene at ordinary pressures neither an electric spark, nor a flame, nor an explosion of fulminate will cause more than a local dissociation of the gas (a fact already established by Prof. H. B. Dixon), but that if the gas be compressed beyond two atmospheres, the dissociation, once started, is propagated without sensible diminution throughout the whole mass of gas. In this way dissociation of the gas was effected in a tube 20 millimetres in diameter and 4 metres long. The acetylene splits up into pure hydrogen and a friable mass of carbon, which forms a cast of the containing vessel, and can be withdrawn intact. At a pressure of 20 atmospheres, which is about half the tension of the saturated vapour of liquid acetylene at 20° C., the explosion develops a tenfold pressure, but the rate of propagation is much below that of true explosive wave of such a mixture as electrolytic gas. The temperature due to the explosion at this pressure is calculated to be 2750° C. As the violence of the explosion increases with increasing initial compression, it was to be expected that liquid acetylene would exhibit the character of a "high" explosive. This MM. Berthelot and Vieille have shown to be the case. Eighteen grammes of liquid acetylene exploded in a steel bomb of 49 c.c. capacity by a hot wire developed a pressure of 5564 kilogrammes per square centimetre. This corresponds to an explosion pressure for the liquid alone of about 9500 atmospheres—a value approaching that of guncotton. The decomposition of liquid acetylene by simple ignition is relatively slow, and appears to take place in two stages, one corresponding to the decomposition of the gas, the other that of the liquid. In an experiment where the liquid occupied ·15 of the containing vessel, a maximum pressure of 1500 kilogrammes per square centimetre was recorded.

Experiments were made to determine whether the compressed gas or liquid could be exploded by mechanical shock. The results were, strictly speaking, negative. Neither by fall, nor crushing with a ram, nor by the impact of a bullet which pierced the containing cylinder, was the acetylene exploded. In the case of liquid acetylene, an explosion followed the shock after a short interval, but this was shown to be due to the ignition of the escaping gas, after admixture with air, by a spark from the breaking metal. A small charge of fulminate of mercury fired in the middle of a cylinder of liquid acetylene detonated the liquid, and shattered the cylinder in the manner of a true explosive.

The authors describe the conditions under which danger may arise by casual elevation of temperature during the manipulation of acetylene. In the first place they note that in generating acetylene by the action of a small quantity of water or excess of calcium carbide in a closed vessel, the carbide may become incandescent and lead to the detonation of the gas. At least one accident due to this cause has already been recorded. Sudden compression of the gas in filling cylinders, or in admitting it into a reducing valve, may likewise raise the temperature to the point of danger. A sharp mechanical shock breaking the containing vessel may cause sparks capable of firing the explosive mixture formed by the escaping gas with the external air.

In conclusion MM. Berthelot and Vieille express their opinion

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